

it is one for sanitary science to deal with. It was clear, however, that this attempted rat extermination provided an opportunity of gaining information regarding the distribution of the various kinds of rats throughout the country, since large numbers of them could be collected from different localities and compared; from this comparison information of direct or indirect practical importance might be gained. It has been kept well in view that to obtain such information was the purpose of the present inquiry. Although the practical value of the information may not seem great, it is hoped that the facts themselves will be of suggestive value to those more acquainted with the ætiology of plague than the writer.

A COMPARISON BETWEEN RATS FOUND IN THE PORTS OF BOMBAY, CALCUTTA, MADRAS AND RANGOON.

This question is of importance, for as a rule the sea-ports are the doors by which the infection of plague enters a country. In all probability plague entered the Bombay Presidency and Upper India by the port of Bombay, and it certainly entered Burma through Rangoon.

In comparing the rodents of the four great ports, one important fact stands out. *Mus decumanus* is common both in Bombay and Calcutta; it is not uncommon in Rangoon, but it is absent from the city of Madras. There must be a definite cause to account for this. There is another peculiarity in the rodents of Madras. The bandicoot is very rarely found in Bombay. It is uncommon in Calcutta, where it is occasionally found burrowing near the numerous tanks of that city. It is absent from Rangoon; a smaller sort of bandicoot is common there. In Madras, however, the large bandicoot is so common that the populace can kill as many as one hundred of them daily, although it is too large to enter traps and has to be killed by blows from sticks. The Madras bandicoot is an outdoor rat, a dweller in drains and outhouses, having a total length of about two feet; it would not be tolerated in the houses, where it could not move without detection. Its mode of life is therefore essentially the same as that of *Mus decumanus*. The rodent fauna of Madras is therefore peculiar in two ways, in the presence of the bandicoot and in the absence of *Mus decumanus*. These two peculiarities are obviously associated with one another. The bandicoot occupies exactly the same position among the rats of Madras that *Mus decumanus* occupies among the rats of Bombay and Calcutta, and since the bandicoot is much more powerful even than *Mus decumanus*, there is no place for this latter rat in Madras unless it can change its habits entirely. A consideration of the rodents of Rangoon lends support to this view. In Rangoon *Mus decumanus* is to be found, but it is much less common than in Bombay or Calcutta; this may be due to the presence of the small bandicoot, *Gonomys varius*, which is, like *Mus decumanus*, an essentially outdoor rat, and must compete with this latter species. Since the

Rangoon bandicoot is much smaller than the Madras one, the grey rat can exist though it does not flourish as in Bombay and Calcutta.

In the last report of the Plague Commission it was shown that *Mus decumanus* was the species which in Bombay had a preponderating influence in plague dissemination. Certain conclusions may be quoted from the report (*Journal of Hygiene*, vol. vii, No. 6).

"With regard to the epizootic amongst the rats, the following conclusions may be formulated :—

- (1) *Mus decumanus* and *Mus rattus* are equally susceptible to plague.
- (2) The incidence of plague is twice as great on the *decumanus* population as on the *rattus* population.
- (3) *Mus decumanus* is the species which is chiefly responsible for the diffusion of plague amongst the rats throughout Bombay city.
- (4) The *decumanus* epizootic precedes the *rattus* epizootic by a mean interval of about ten days.
- (5) The *rattus* epizootic is directly attributable to the *decumanus* epizootic.
- (6) Plague persists in the rats in Bombay city during the off season. This persistence is due chiefly to *Mus decumanus*."

The conflicting natures of the first and second statements are reconciled and explained by the fact that *Mus decumanus*, on an average, harbours twice as many fleas as *Mus rattus*.

It seems, therefore, that *Mus decumanus* is an important factor in the sanitation of a port. After reading the conclusions quoted above, anyone must be struck with the coincidence that Madras, the one port which does not harbour *Mus decumanus*, is the one port which has never been seriously infected with plague. That Madras is not wholly protected by its climate is shown by the fact that there has been at least one outbreak of plague, temporary but severe, on the outskirts of the city.¹ On the other hand, it must be remembered that plague persists to a grievous extent among certain provinces of India into which *Mus decumanus* seldom or never penetrates.

The insanitary effect of *decumanus* as a port rat can be seen from another point of view. In a port where this rat is firmly established, there must be much more interchange between ship and shore rats than in a port like Madras, where the large bandicoot alone is the common outdoor rat, for the bandicoots probably never enter ships, whereas *Mus decumanus* is perhaps the commonest of all sea-going rats. It has not yet been thoroughly ascertained to what extent the different species of rats infest ships plying in tropical seas. Judging from very scanty observations and inquiries it appears that any one ship harbours only one species at a time—sometimes *Mus rattus*, sometimes *decumanus*. A thorough investigation of this subject would be interesting and important.

¹ If, as appears, the bandicoots themselves are particularly susceptible to plague, the absence of *Mus decumanus* from Madras is of no significance.